



**City of Santa Barbara**  
Parks and Recreation Department

**Memorandum**

**DATE:** June 15, 2011

**TO:** Creeks Restoration/Water Quality Improvement Program  
Citizen Advisory Committee

**FROM:** Jill Murray, Water Quality Research Coordinator

**SUBJECT:** **WATER QUALITY RESEARCH AND MONITORING PROGRAM  
UPDATE AND FISCAL YEAR 2012 RESEARCH PLAN**

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COMMITTEE DIRECTION – FOR ACTION

That the Committee receive an update on the Water Quality Research and Monitoring Program and concur with the staff recommendation to implement the proposed Research Plan for Fiscal Year 2012.

DISCUSSION

Background

In June 2010, the Committee concurred with the staff recommendation to implement the Research Plan for Fiscal Year 2011 (FY11). In January 2011, the Committee received a presentation and discussed the results from the Fiscal Year 2010 Annual Water Quality Report. In this report, the Committee will receive a mid-year update on FY11 sampling, with a focus on sediment quality, storm monitoring, street slurry sealing, and microbial source tracking, along with recommended changes for the 2012 Fiscal Year Research Plan. The proposed FY12 Research Plan is attached.

The goals of the research and monitoring program are to:

1. Quantify the levels (concentration and flux, or load) of microbial contamination and chemical pollution in watersheds throughout the City.
2. Evaluate impacts of pollution on beneficial uses of creeks and beaches, including recreation and habitat for aquatic organisms.
3. Evaluate the effectiveness of the City's restoration and water quality treatment projects, which includes collecting baseline data for future projects.
4. Identify sources of contaminants and pollution in creeks and storm drains.
5. Evaluate long-term trends in water quality.

The underlying motivation behind the monitoring program is to obtain information that the City can use to:

1. Develop strategies for water quality improvement, including prioritization of capital projects and outreach/education programs.
2. Communicate effectively with the public about water quality.

The monitoring program consists of eight key elements:

1. Watershed Assessment
2. Storm Monitoring
3. Restoration and Water Quality Project Assessment
4. Beach Water Quality
5. Source Tracking/Illicit Discharge Detection
6. Creeks Walks/Clean ups
7. Bioassessment
8. Methods Development

Selected updates from several elements are presented below. Research questions supporting each goal and element can be found in the quarterly Water Quality Report at [www.sbcreeks.com](http://www.sbcreeks.com). Additional results will be presented in the Annual Water Quality Report, to be presented in January 2012.

#### Watershed Assessment - Sediment Quality

Sediment contamination is a concern for water quality because many pollutants adhere to sediment particles, accumulating and persisting for a much longer time than they would in the water column. However, assessing the impact of pollutants in sediments is challenging because the sediment can render pollutants unavailable to organisms. In August 2010 the Creeks Division completed a fourth year of sediment testing. In previous years, creek outfall sites (lagoons) were tested for a broad range of constituents in order to complete an assessment based on the State's Sediment Quality Objectives. Results showed that lagoon sediments were generally in healthy condition, containing low levels of most constituents and not causing toxicity to test organisms. A remaining question for the creek outfall sites was the potential impact of wildfires on polycyclic aromatic hydrocarbons (PAHs) and metals in sediments. In addition, several sites contained concerning levels of bifenthrin, a pyrethroid pesticide. In FY11, the following creek sites were added to investigate pyrethroid and PAH distribution: Arroyo Burro at Torino Drive, Las Positas Creek at Modoc Road, Mission Creek at Gutierrez St., Old Mission Creek at W. Anapamu St. ,and Sycamore Creek at Cacique St.

Results showed no increase, or elevated levels, of PAHs or metals in outfall or creek sites. However, bifenthrin was found at concerning levels in Arroyo Burro Estuary, Laguna Channel, and Old Mission Creek at W. Anapamu. The Creeks Division will continue to address the issue of pyrethroid pesticides in outreach efforts. Toxicity

testing showed no acute toxicity in outfall or creek sites, suggesting that pyrethroids are bound to sediment grains and are not generally bioavailable to bottom-dwelling organisms. However, during storm events, sediments can be suspended and contaminants can become available and toxic to organisms.

### First Flush Storm Sampling

Each fall the Creeks Division samples the first storm of the season, as this “first flush” is known to lead to the highest concentrations of contaminants in stormwater runoff. In previous years, creek “integrator sites” (lowest sites on creeks, integrating water quality issues across the entire watershed) have been sampled during every first flush event. Based on the FY11 Research Plan, storm drain and gutters were added to first flush sampling, which occurred on October 6, 2010. Runoff was collected from runoff entering catch basins at Cota St./Voluntario St. and Gutierrez St./Quarantina St., a drop inlet at MacKenzie Park parking lot (in support of a Creeks project), water discharging from the Serena Drain, and the integrator sites Laguna Channel at Chase Palm Park, Mission Creek at Montecito Street, Arroyo Burro at Cliff Drive, and Sycamore Creek at the railroad bridge. These sites were sampled between 1:55 AM and 7:15 AM, when 0.25”-0.35” of rain had fallen. Water was tested for metals, pesticides, hydrocarbons, and toxicity. Metals and hydrocarbons were not detected at elevated concentrations; however other results were concerning.

In previous years, very few detections of pesticides have been found in creek samples, during both dry and wet weather. Based on a recommendation by the State-funded UP3 Priority Pesticide list, several pesticides were added to the testing suite in FY11. The wood preservative pentachlorophenol was found in almost every sample, albeit at low levels. In addition, organochlorine pesticides were detected in drain samples, including the legacy pesticide chlordane and DCPA (dacthal). Malathion, an organophosphorus pesticide, was detected in one drain sample.

Another change in FY11 storm sampling was that creek water toxicity was tested using invertebrates and algae, which are thought to be more sensitive to some constituents than the vertebrate fathead minnow, which had been used in most previous tests. No toxicity was observed in creek sites, with the exception of Laguna Channel at Chase Palm Park, which showed toxicity for the algae test. Storm drain and catch basin sites were tested with fathead minnows or the invertebrate *Ceriodaphnia*. Results showed that runoff from Serena Drain was not toxic to fathead minnows. MacKenzie Park parking lot runoff and one catch basin showed 50%, and 25%, survival of fathead minnow, respectively. A second catch basin showed 0% survival of *Ceriodaphnia*. These results show that while Santa Barbara creeks are generally not toxic to aquatic organisms during storm events, due to large amounts of dilution with clean runoff, runoff that is sampled closer to the site of urban activities exhibits toxicity to sensitive species.

### Street Slurry Sealing

The roads of Santa Barbara are on a five to eight year rotating schedule for reapplication of slurry sealant, resulting in a large number of roads resealed each year. Washington State and several cities have banned the use of coal-based road sealants due to high levels of toxic polycyclic aromatic hydrocarbons (PAHs) in runoff from sealed surfaces. In California, asphalt-based seal is used. While posing a lesser water quality risk than coal sealant, the asphalt based sealant became a concern for the Creeks Division based on anecdotal evidence of foaming on freshly sealed streets during rain events.

In the summer of 2010, the Creeks Division continued the exploration of the impact of asphalt road slurry seals on water quality that it had started in October 2009. The Creeks Division wanted to further investigate whether the sealing of streets leads to pollution in creeks, due to rain runoff over surfaces and excess contaminated sediment material reaching creeks. The October 2009 pilot project showed a higher level of toxicity in simulated runoff from a recently sealed road compared to a control site, and higher levels of PAHs in swept sediments from the slurry site compared to a control site. The Summer 2010 study expanded the 2009 pilot project to include three testing sites. The study was conducted with the assistance of a water quality intern, with advisory input from Dr. Arturo Keller (UCSB).

Preliminary results of the Summer 2010 testing suggest that runoff from recently slurried roads may have high levels of toxicity and high levels of methyl blue active substances (MBAS, indicating anionic surfactants), though control sites also had high levels of MBAS. Only one site had detectable PAHs after the roads were resealed. Due to methodological difficulties, results from toxicity testing were statistically inconclusive. However, results suggest that early runoff from recently sealed sites can be highly toxic, with the effect diminishing during later runoff.

### Microbial Source Tracking

In December 2011 the Creeks Division received a Draft Final Report for the Source Tracking Protocol Development Project from Dr. Patricia Holden at UCSB. The report supports work on a Proposition 50 funded research project that will be completed in Fiscal Year 2012. In February 2011 the final report for the "Canine and Microbial Source Tracking in Santa Barbara, CA" was published by the Water Environment Research Foundation, the organization that funded the project. In addition, several peer-reviewed articles have been authored by Dr. Holden and her colleagues at UCSB, based on work completed with the City.

### Beach Water Quality

Arroyo Burro Beach had frequent warnings during summer 2010 due to indicator bacteria levels, and the beach was singled out by Heal the Bay for poor water quality. Reasons for the warnings were addressed in the FY2010 Annual Report and presented to the Committee in January 2011. Since summer 2010, warnings at Arroyo Burro

Beach have decreased considerably, with the exception of typically high levels found during wet weather.

### Recommendations for FY12

Several changes are included in the proposed Fiscal Year 2012 Research and Monitoring Plan (attached), including:

1. Adding creek sites to sediment sampling events, including sediment directly below storm drain outfalls.
2. Adding an investigation of salinity in Sycamore Creek, due a recent listing on the on the 303(d) list of impaired water bodies.
3. Addition of toxicity testing with algae species in Mission Creek during dry weather, to support the investigation of the 303(d) impairment for "Unknown Toxicity."
4. Addition of several water quality and restoration projects, including fish passage and parking lot retrofit projects, post-construction BMP assessment, and Mission Lagoon, to sampling efforts for evaluating project effectiveness.
5. Sampling of groundwater discharge (sump pumps) to storm drains for organic contaminants.
6. Preliminary testing for impacts of recycled water irrigation runoff on creeks, including nutrients, salts, and pharmaceutical products.
7. Developing a test kit for enforcement activities, including methods to test quickly for nutrients, hydrocarbons, chlorine, bromine, and some metals.

A modified sampling table will be completed after additional sampling results from FY11 have been reviewed. The updated table will be discussed with the Committee when the Annual Water Quality Report is presented next January.

### Next Steps

Staff will begin implementing the FY12 Research Plan and perform scheduled weekly, quarterly, project, and storm monitoring beginning July 2011. Reporting will also continue on a quarterly and annual basis.

cc: Cameron Benson, Creeks Restoration/Clean Water Manager  
Jill E. Zachary, Assistant Parks and Recreation Director